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Rubber Research Scheme

(CEYLON).

Second Quarterly Circular

FOR

1924.

IMPERIAL BUREAU OF MYCOLOGY 25 MAR 1927

Peradeniya, August, 1924.

[THIS CIRCULAR IS PRINTED ON RUBBER LATEX PAPER.]

GENTLEMEN,

Herewith the Second Quarterly Circular for 1924 dealing with the following subjects :—

"Glass Hydrometers for Latex."
By T. E. H. O'Brien, Chemist.

Report on "Preservation of Latex with Ammonia—Nature of Deposit."

Report on "Rubber prepared with Sodium Sulphite."

Report on "The Effect on the Vulcanising and Mechanical Properties of Rubber of the addition of Ammonia to the Latex."

Received from the London Advisory Committee, Imperial Institute.

"Further Notes on Packing of Rubber."

"Note on Budding of Rubber in Ceylon."
By J. Mitchell, Organising Secretary.

Bulletins and Reports received.

J. MITCHELL,
Organising Secretary.

RUBBER RESEARCH SCHEME (CEYLON),
Peradeniya,
1st August, 1924.

GLASS HYDROMETERS FOR LATEX.

A number of tests have now been carried out with the experimental hydrometers constructed at the Research Scheme Laboratories. Before giving the results it is advisable to explain the limitations of the accuracy of hydrometers for estimating the rubber content of latex. No one hydrometer can give correct readings in all latices. The variable factor in latex, as far as the hydrometer is concerned, is the rubber content of the "dry" latex, *i.e.*, as it leaves the tree. A hydrometer merely shows the extent to which "dry" latex of a certain rubber content has been diluted with water. For example a hydrometer constructed for "dry" latex containing 37.5 % rubber will give readings which are too high with a latex which contained 40 % rubber as it left the tree, and readings which are too low with a latex which contained 35 % rubber as it left the tree. The rubber content of latex from different trees may vary by as much as 10%, but where latex from many trees is bulked together an average figure will be obtained. In constructing the glass hydrometer, 37.5 % (3¾ lbs. per gallon) has been taken as an average for Ceylon latex, and there is little doubt that with latex of this rubber content, there would be very good agreement between hydrometer reading and actual rubber content. When new cuts are opened, the rubber content of the latex is considerably higher for the first month or two, and it is then found that the hydrometer reading is higher than the actual rubber content. By means of a correction table which has been drawn up for all readings over 3¾ lbs. per gallon, this unavoidable error can be very much reduced. The above remarks on hydrometers also apply to the "Metrolac," but in this instrument 35% has been taken as the average rubber content of "dry" latex, and this accounts for the error which is often found with even a new Metrolac in Ceylon. One of the experimental glass hydrometers has been in use in a factory for 3½ months without breakage.

The following is a summary of figures obtained for crop estimated by hydrometer, compared with actual crop in the above-mentioned factory :—

	March (27-31).	April.	May.
Dry weight of rubber ...	939 Lbs.	7,631 Lbs.	1,607 Lbs.
Weight of rubber estimated from hydrometer readings	974 „	7,874 „	1,605 „
Error	3.7 %	3.18 %	.124 %
Weight of rubber estimated from Metrolac (new instrument) readings	...1,131¾ Lbs.	9,086 Lbs.	1,939 Lbs.
Error	20.4 %	19.06 %	20 %

Similar records were kept at the laboratory for a block of 100 trees. When tapping was resumed after wintering, the rubber content of "dry" latex from these trees was approximately 40%. Since then the rubber content has gradually fallen to 35%, and this change has been reflected in the hydrometer readings. During May the readings were higher than actual rubber content, but the error is now on the other side, as is shown by the following figures :—

Date.	Rubber content by hydrometer.	Actual rubber content.	% error.	Correction from table.	% error after correction.
3.5.24	47.5 %	41.2 %	+ 6.3 %	4.5 %	+ 1.8 %
5.5.24	45 %	40.4 %	+ 4.6 %	3.4 %	+ 1.2 %
8.5.24	41.3 %	39.6 %	+ 1.7 %	1.7 %	—
10.5.24	41.3 %	39.4 %	+ 1.9 %	1.7 %	+ .2 %
12.5.24	41.9 %	39.6 %	+ 2.3 %	2.0 %	+ .3 %
14.5.24	38.8 %	37.4 %	+ 1.4 %	.6 %	+ .8 %
16.5.24	41.9 %	38.8 %	+ 3.1 %	2.0 %	+ 1.1 %
18.5.24	33.1 %	32.0 %	+ 1.1 %	—	+ 1.1 %
26.5.24	41.9 %	39.5 %	+ 2.4 %	2.0 %	+ .4 %
29.5.24	36.9 %	36.2 %	+ .7 %	—	+ .7 %
3.6.24	36.3 %	36.6 %	— .3 %	—	— .3 %
7.6.24	35.0 %	36.8 %	— 1.8 %	—	— 1.8 %
9.6.24	35.6 %	36.2 %	— .6 %	—	— .6 %
11.6.24	35 %	36.2 %	— 1.2 %	—	— 1.2 %
13.6.24	32.5 %	35 %	— 2.5 %	—	— 2.5 %

The behaviour of this block of trees, since the wet weather started, appears to be abnormal since several other blocks of trees under observation have not shown such a large reduction in rubber content. The following is a summary of figures obtained from 4 blocks of trees (200 trees in each block):—

	A.	B.	C.	D.
Number of tappings ...	4	4	6	4
Rubber content by hydrometer (uncorrected) ...	42.2	42.3	43.1	43.1 %
Correction from table ...	2.1	2.2	2.5	2.5 %
Rubber content by hydrometer (corrected) ...	40.1	40.1	40.6	40.6 %
Rubber content, Actual ...	39.3	39.6	40.1	40.3 %
Error	± .8 %	± .5 %	± .5 %	± .3 %

(An error of .6 per cent. corresponds to 1 oz. per gallon or 1.5 per cent. error in dry weight.)

It will be noted in the above tables that while a correction is made when the "dry" latex is over 37.5 per cent., no ± correction is made when the "dry" latex is below 37.5 per cent. A suitable correction table can be drawn up, but would not be suitable for factory use as the rubber content of the "dry" latex is usually not known, since a certain amount of dilution always takes place during collection. An estate whose "dry" latex was consistently below 37.5 per cent. would require to make a correction.

It was decided at the last meeting of the Technical Committee that the hydrometer should be forwarded to the Rubber Growers' Association for their approval, and that a supply of them should be made for extended factory trials. It is hoped that the price will not exceed Rs. 6.

T. E. H. O'BRIEN,
Chemist, R. R. S.

Hydrometers for Ammonia.

A supply of hydrometers, suitable for testing the strength of Ammonia for latex preservation, is now available for subscribers to the Research Scheme at cost price, Rs. 5.50.

REPORT ON

PRESERVATION OF LATEX WITH AMMONIA—NATURE OF THE DEPOSIT.

In the report dated the 26th July, 1923, on the preliminary examination of ten samples of latex preserved with ammonia (Nos. 1A--5A, 10A—14A) it was mentioned that a deposit was present in all the containers in which the samples were forwarded from Ceylon. A detailed examination has now been made of the deposits from samples Nos. 3A and 5A.

The deposits, which amounted to about 4 ozs. in each case, consisted of dark coloured material which could be stretched when dry, but was only slightly elastic and broke easily.

The dry deposit, which contained about 30 per cent. of rubber, was submitted to chemical examination with the results shown in the following table, which are expressed as percentages of the dry deposit:—

	Deposit from Latex No. 3A (preserved with 1.80 per cent. of ammonia).*	Deposit from Latex No. 5A (preserved with 2.92 per cent. of ammonia. †
	Per cent.	Per cent.
Acetone Extract	11.6	6.4
Nitrogen insoluble in acetone	8.4	1.6
Ferric oxide	9.0	15.1
Magnesium exide	16.0	13.1
Phosphoric anhydride	28.0	23.6

Traces of compounds of potassium, silica and tin were found.

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* Calculated as dry ammonia on the dry rubber.

† About 30 per cent. of the nitrogen present was volatile in steam in the presence of magnesium oxide.

The results show that the deposit consists chiefly of mineral matter in which magnesium, iron and phosphoric acid predominate. Acetone soluble substances and derivatives of protein and ammonia are also present in addition to rubber, and it is possible that the phosphoric anhydride and magnesium oxide, which are in equimolecular proportions form part of a complex organic compound.

Dr. de Vries states that in Java he has found magnesium ammonia phosphate in similar deposits. In the deposits from the Ceylon latex, however, only a small quantity of the nitrogen occurred as ammonia, and the bulk of the magnesium oxide and phosphoric anhydride must therefore have been present in some other form than magnesium ammonium phosphate.

The iron and tin in the deposit may have been derived from the tin containers.

IMPERIAL INSTITUTE,
LONDON, S. W. 7.,
12th February, 1924.

RUBBER PREPARED WITH SODIUM SULPHITE.

In view of the inconclusive results obtained under the previous Scheme in the experiments on the effect of the addition of sulphite to latex (Series I and Series II), the London Committee suggested that a further study of this question should be made.

At their request the four samples dealt with in this report were prepared by the Chemist in Ceylon from bulked latex on Culloden Estate.

The latex was divided into two portions, one of which was coagulated with acetic acid in the usual way and the other preserved by the addition of 0.2 per cent. of a 10 per cent. solution of sodium sulphite crystals 24 hours before adding acid for coagulation. Samples of crepe and unsmoked sheet rubber were prepared from both latices by the ordinary methods.

Results of Examination.

The results of vulcanising and mechanical tests of these rubbers in a rubber-sulphur mixing at the Imperial Institute are shown in the following table:—

Sample No.	Form.	Amount of 10 per cent. solution of sodium sulphite (crystals) added to latex. (Per cent.)	Time of Cure (mins.)	Tensile Strength (lbs. sq. in.)	ELONGATION.		Slope.
					At Break. (Per cent.)	At standard load (1.04 kgs. sq. mm.) (Per cent.)	
1007	Crepe	nil	160	2320	842	760	37
1009	„	0·2	150	2170	837	769	37
1008	Sheet	nil	105	2440	875	780	38
1010	„	0·2	100	2440	844	760	38

It will be seen that in these tests the addition of sodium sulphite has slightly decreased the time of vulcanisation. These results are in agreement with those of other investigators.

IMPERIAL INSTITUTE,
LONDON, S. W. 7.
27th February, 1924.

REPORT ON THE EFFECT ON THE VULCANISING AND MECHANICAL PROPERTIES OF RUBBER OF THE ADDITION OF AMMONIA TO THE LATEX.

These three samples of crepe rubber were prepared to determine whether the addition of ammonia to latex had any effect on the vulcanising and mechanical properties of the rubber. The samples were as follows:—

No. 32.—Prepared on 30th August, 1923, on Culloden Estate from fresh latex with approximately twice the amount of acetic acid normally used.

No. 34.—Prepared on 30th August, 1923, on Culloden Estate from a portion of the same latex as sample No. 32, but 3.75 per cent. of 20 per cent. ammonia added before coagulation with excess of acetic acid. (The diluted latex thus contained 3.62 per cent. of 20 per cent. ammonia.)

No. 30.—Prepared from a portion of the same latex as sample No. 34, containing the same amount of ammonia, and coagulated at the Imperial Institute with excess of acetic acid three months after the addition of the ammonia.

The latex from which sample No. 30 was prepared was in a good state of preservation when examined at the Imperial Institute. Prior to coagulation it was well shaken and its alkalinity determined. This was found to correspond to 3.65 per cent. of 20 per cent. ammonia as compared with 3.62 per cent. calculated on the amount of ammonia added in Ceylon.

The results of mechanical and vulcanising tests in a rubber sulphur mixing were as follows:—

	STANDARD CURE.				TENSILE OPTIMUM CURE.			
	Time of cure (mins)	Tensile strength lbs. sq in.	ELONGATION. At Break. Per cent.	ELONGATION. At standard load. Per cent.	Slope.	Time of Cure mins.	Tensile strength lbs. sq. in.	Elongation at standard load. Per cent.
No. 32	130	2,340	876	797	39	130	2,340	797
„ 34	150	1,990	837	790	36	140	2,250	817
„ 30	120	2,170	829	780	40	120	2,170	780

It will be seen that there are small differences in the time of cure of these rubbers, and that No. 34, in which ammonia was added shortly before coagulation, cured more slowly than sample No. 30 prepared three months later from another portion of the latex containing the same amount of ammonia. The two rubbers prepared from latex containing ammonia are not quite as strong as that prepared from fresh latex, but the differences are not marked.

These experiments confirm the results previously obtained with a series of crepe rubbers prepared at the Imperial Institute from latices preserved in Ceylon with varying quantities of ammonia. In the case of those rubbers no control samples was available and no direct comparison could therefore be made.

IMPERIAL INSTITUTE,
LONDON, S. W. 7.
17th April, 1924.

FURTHER NOTES ON PACKING OF RUBBER.

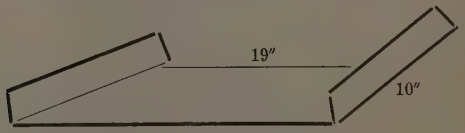
In the First Quarterly Circular for 1924 under "Notes on Packing of Rubber" mention was made of a method of packing rubber in bales, which had been the subject of a lecture given by Mr. J. B. Harmsen of the Malang Experiment Station, Java.

Mr. Harmsen has very kindly supplied me with further particulars of this method, which he states has been employed for three years without adverse report from the buyers.

Method.—The following is an abstract from Mr. Harmsen's lecture and from the particulars supplied in correspondence:—

The best results with crepe rubber have been secured by using lengths of 36″ by 10″ and the crepe is finished by passing it once through a sheeting machine.

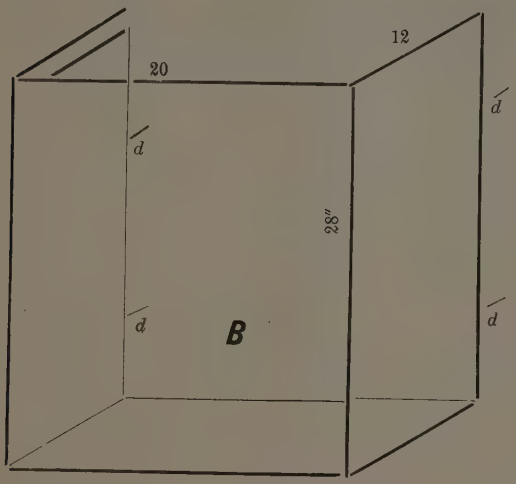
This crepe is folded in a wooden frame (***A***),



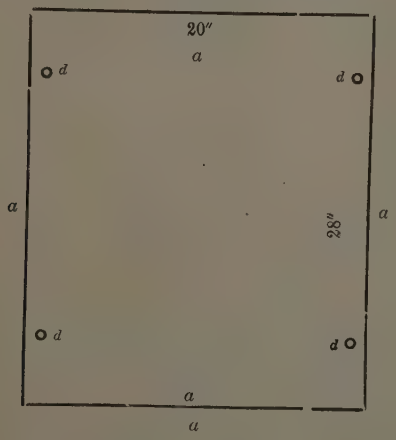
A

the quantity being approximately 105½ lbs. which allows for a further 4½ lbs. for wrapping making a bale of 110 lbs. weight.

From A the crepe is transferred to a wooden frame (**B**)



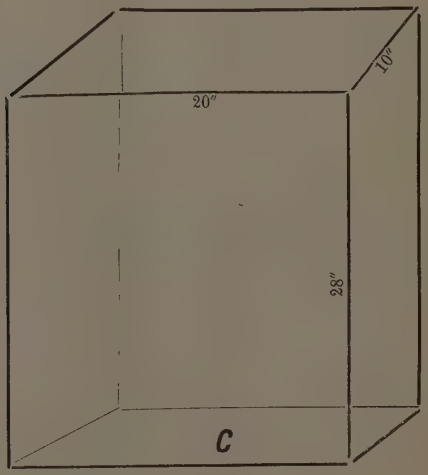
which is a bottomless chest and has a door (*a*)



closed by means of pegs shown at (*d*).

The rubber is then in bale form inside the open chest. The pegs (*d*) are removed, the door (*a*) taken away, and the contents placed on the crepe to be used as a wrapper which has been laid on the floor. The rubber for wrapping is the same kind and quality as the contents and is of a width which ensures that the contents are completely enclosed.

The matting used for the external wrapping is known as tobacco or rush matting having a measurement of 67 inches by 39½ inches and it requires two such mats to make one complete bale. The best wrapping is a fairly closely woven rush matting and the two mats are sewn together with Raffia fibre on a wooden frame (***C***).



The wrapping is turned inside out and drawn over the rubber bale in the same way that one would put on a stocking and the free ends of the wrapping are then sewn together with the Raffia fibre.

The cost of a complete wrapping is approximately 4½*d* or 29 rupee cents. The bale is then ready for shipment. Care is to be taken that the mats are well stretched, well joined and are fastened at regular intervals by quills.

During shipment it is advised that the bale be placed so that the rubber is end on instead of flat. Thus any superimposed weight during shipment will cause the separate sheets of rubber to be spread apart rather than blocked together.

The method described above is most applicable to packing of crepe rubber, but can be used for sheet rubber also, though there is a tendency in the latter for the bales to flow out of shape or to become blocked.

It would appear that such a method of packing would effectually solve the problem of contamination of rubber with wood splinters, saw-dust, grit, etc., which is the constant complaint of manufacturers where wooden cases are used.

It is contended that all shipments packed in this way have reached their destination in an entirely satisfactory condition and that the rubber has been well reported on.

In these circumstances it would be of considerable value if Members of the Rubber Research Scheme would undertake experimental shipments of rubber packed in this way and report the results.

At the International Rubber Congress held in Brussels during April, a paper on "Packing Rubber in Mats" was read by Mr. J. G. Fol, Propaganda Secretary for the Dutch East Indies, and he strongly urged the adoption of the method described above. He pointed out the following special advantages:—

1. Complete protection of the rubber against dust and grit, only the covering layer getting dirty.

2. The manufacturer receives the rubber in the same clean condition as when it left the estate and it is not necessary to sort out and brush the rubber nor to rewash it.

3. It is a cheaper method than packing in wooden cases. The mats can be more easily repaired at the docks than cases and the expense of cooperage will be reduced. The tare is practically constant and difficulties arising out of the differences in the weights of wooden cases are avoided.

J. MITCHELL,

Organising Secretary.

BUDDING OF RUBBER IN CEYLON.

At the Executive and Technical Committee Meetings of the Rubber Research Scheme held on July 16th, 1924, particular attention was drawn to the necessity for further experimental work on budding of rubber to be carried out on Ceylon Estates. It was considered that while no very definite information is available at the present time as to the merits or demerits of this method of propagation, the possibilities of its proving successful are such that Ceylon cannot afford to neglect this method.

In the First Quarterly Circular Mr. R. A. Taylor gave an outline of the procedure which should be adopted by estates.

At the Meeting of the Executive Committee referred to above, it was decided that steps be taken to acquire for the Research Scheme a block of land on which selected trees could be grown and where budding could be done on a scale sufficient to supply bud wood to Members of the Research Scheme.

It was further decided that Mr. D. R. M. Rajapaksha (Laboratory Assistant, Research Scheme Laboratories, Culloden Estate, Neboda), should give demonstrations of the principles and technique of budding on Culloden Estate to Members of Estate Staffs requiring such instruction.

It was also decided that the services of Mr. T. V. Thamotharam of the Department of Agriculture should be made available for instructional purposes.

Estates desiring to take advantage of these facilities should communicate with Mr. R. A. Taylor at the Research Scheme Laboratories, Culloden Estate, or with the Offices, Rubber Research Scheme, Peradeniya.

J. MITCHELL,
Organising Secretary.

Note.—The term clone or cloon referred to on page 12 of the First Quarterly Circular is used to denote the whole of the individuals derived vegetatively (as in budding) from one mother tree.

BULLETINS AND REPORTS RECEIVED.

Bulletins.

Bulletin No. 35, "Vulcanisation Tests" (New Series), being tests carried out at the Imperial Institute, London, on rubber prepared under the supervision of the Technical Officers in Ceylon, has been received from the Printers and copies have been circulated.

Reports from London.

(*a*) Report on the effect on the vulcanising and mechanical properties of rubber of the addition of ammonia to the latex (included in this circular).

(*b*) Report No. 4 on "Vulcanisation Tests" (New Series) is in the hands of the Printers for publication as Bulletin No. 36.

(*c*) 2nd Report on "Rubber prepared with Sodium Silicofluoride as Coagulant." At the request of the Rubber Growers' Association it has been decided that this report and the one referred to in the First Quarterly Circular should not be published until the experiments are completed.

MILLER & Co.

KANDY.